

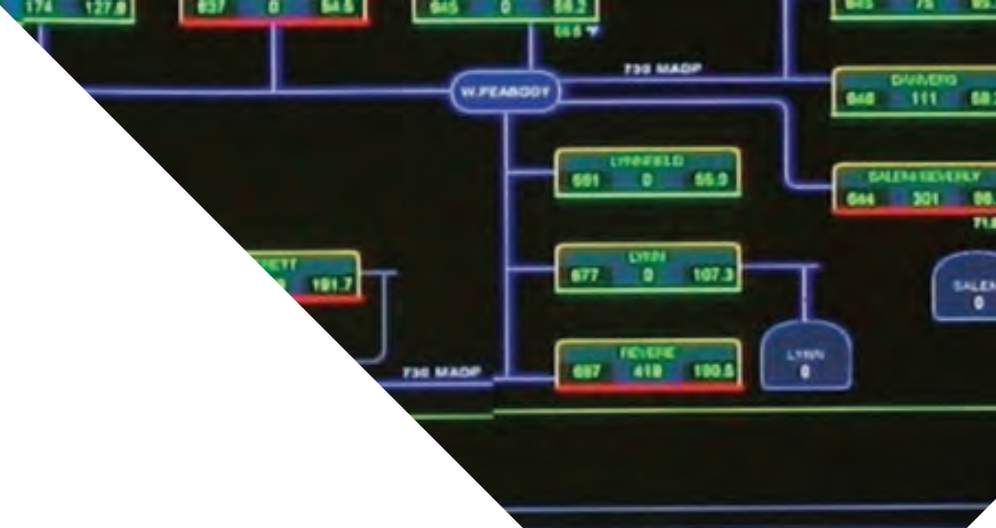


nationalgrid

# Future Grid Plan:

Empowering Massachusetts by  
Building a Smarter, Stronger, Cleaner  
and More Equitable Energy Future

Executive Summary  
September 2023



# Building Tomorrow's Energy System

## A Smarter, Stronger, Cleaner, More Equitable Energy Future

A network that supports the Commonwealth's climate, clean energy, and equity goals and delivers the fair, affordable, and clean energy transition for all our customers and communities.

## Customer Programs

Provide customers with information, products, and services to enable clean energy, efficiency, and demand management options so they can make the energy choices that work for them, when they want them.

## Technology and Platforms

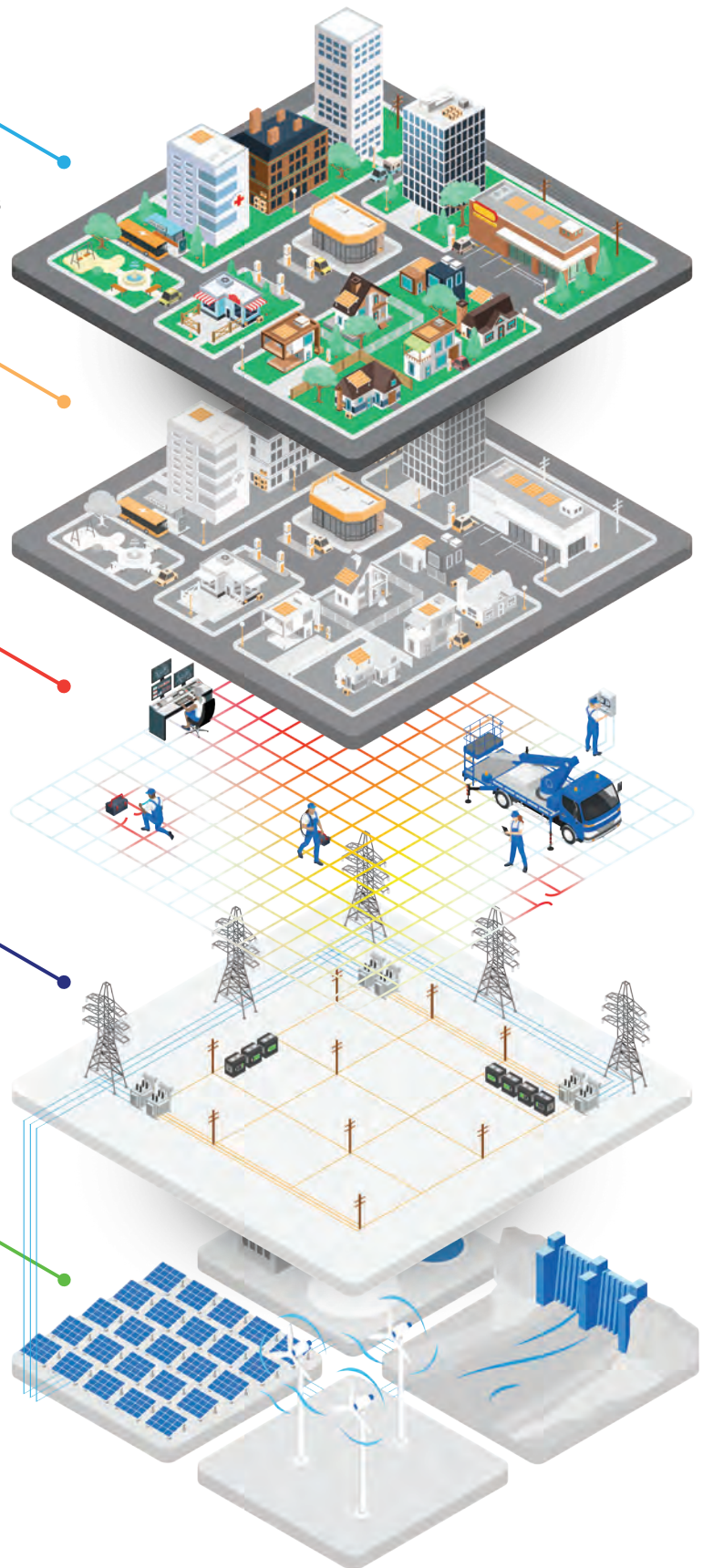
Create a smart, flexible, and dynamic grid that can manage the future supply mix, energy needs, and leverages distributed resources with real-time communications to solve grid problems and provide grid resiliency.

## Network Investments

Build a strong network that is one step ahead of customer needs, ready to respond to developer requests, and is reliable, resilient, and secure, regardless of weather or evolving threats.

## Connecting our Customers to Renewables

Enable and connect our customers to the increased renewable generation on the grid – wind, solar, hydro, geothermal, and storage.



**The investments proposed in this Future Grid Plan will empower our customers and communities throughout Massachusetts by building a smarter, stronger, cleaner, and more equitable energy future.**

Increased system capacity to support 1.1 million more personal passenger vehicles, and easy, smart charging options by 2035

Electrification of transit, and public and private fleets, improving local air quality and driving down climate pollution

Information, products and services to leverage smart building technology to help manage costs and reduce emissions

A ready and reliable grid to enable the connection and efficient operation of an additional 750,000 electric heat pumps by 2035

Investment and siting decisions made with communities

Enabling the connection of 2x the amount of solar and storage to the network by 2035, providing opportunities for more customer control and community resilience

Enhanced reliability and resilience, through a stronger, more flexible, and more secure network

11,000 more jobs by 2030, with a focus on increasing the diversity of the energy workforce and generating \$1.4 billion in economic activity



## A message from our leadership



Steve Woerner  
NE President



Nicola Medalova  
Chief Operating  
Officer, NE Electric

**Every day at National Grid, our more than 6,500 team members work together to build a smarter, stronger, cleaner, and more equitable energy future for our customers and communities in more than 240 towns and cities across 5,900 square miles.<sup>1</sup>**

**We know what we do matters immensely, and how we do it matters even more.**

A smarter and more intelligent system can provide customers with more options and the ability to make clean energy decisions that work for them. A stronger system will be one that is more robust, better able to withstand the impacts of climate change, and protect against evolving threats. And, a cleaner system can connect more renewable resources, energy storage, and electrified transportation and heating more quickly at all levels and leverage these resources to create value for the grid and customers.

We are at an inflection point. To meet the Commonwealth's ambitious climate change and clean energy goals – goals that we share – we must begin building this future now. And, we know that we cannot build it alone and that we don't have all the answers. Massachusetts is a state known for solving big problems and delivering big results. It is a state with an innovation ecosystem and is focused on equity that drives collaboration, partnership, and new ways of thinking. We will need to harness this innovative and collaborative spirit to achieve the energy future that works for all.

By developing and submitting this Future Grid proposal as our Electric Sector Modernization Plan, we are taking a first step toward defining the scope and scale of what we collectively must do over the next 25 years to combat climate change and enable a more electrified future. We are doing this by identifying the system investments and changes needed in the electric distribution system, engaging broadly to stimulate ideas, and encouraging input to ensure this proposal is responsive to and supportive of the needs and expectations of our all customers and communities.

We have an opportunity to make real and lasting change. And, while we are building and preparing the grid and our broader energy system for the future, we remain focused on what is right in front of us. Our customers expect and deserve great service and safe, reliable and affordable energy today, which we will continue to deliver.

We are committed to empowering Massachusetts by building a smarter, stronger, cleaner, and more equitable energy future. And we are excited to share our Plan to do that and truly look forward to being a partner for progress in all our communities across the Commonwealth.

A handwritten signature in blue ink that reads "Steve Woerner".

Steve Woerner  
NE President

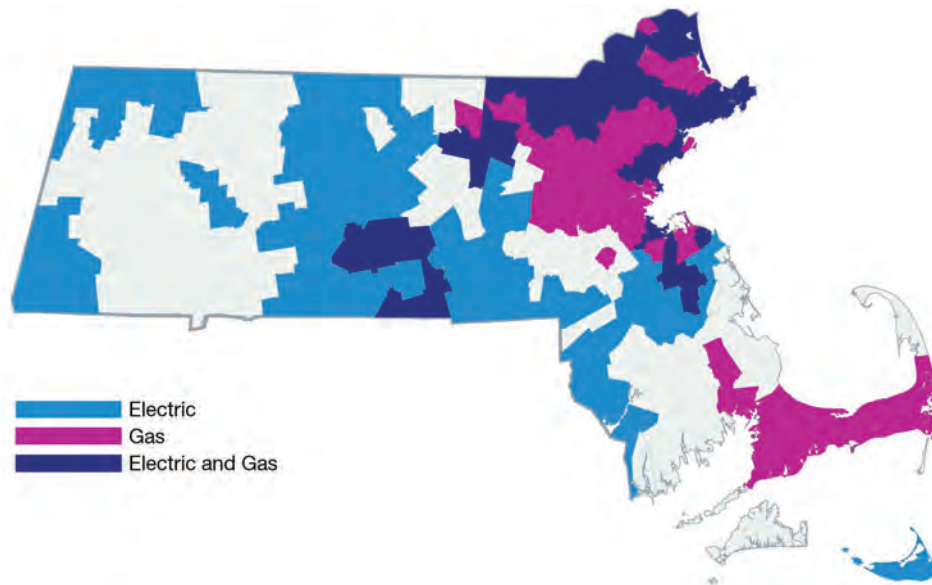
A handwritten signature in blue ink that reads "Nicola Medalova".

Nicola Medalova  
Chief Operating Officer, NE Electric

<sup>1</sup> Refers to both National Grid's Massachusetts' electricity and gas services.

## About us

We're taking action to achieve net zero and to deliver a fair, affordable and clean energy future to **2.3 million customers** in more than **240 towns and cities...**



### ...by our teams...



### ...while supporting our communities...



## Serving our 1.3M electric customers via our networks...



**18K**

Miles of electric  
distribution lines



**178**

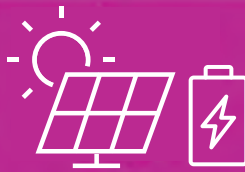
Distribution  
substations



**720K**

Poles

## ...and by making customer connections.



**200 MW**

Total DER  
connected in 2022



**~1,800**

EV Chargers  
enabled to date



**18K+**

Households that installed  
heat pumps in 2022  
through the Mass Save  
program, with 10k+  
supported by National Grid

**2GW**

DER connected  
to our network

**~32K**

Additional EV Chargers  
to be enabled via  
Phase 3 EV programs

**45K+**

Planned additional  
households for heat pump  
installation through  
Mass Save by 2024, with  
21k+ targeted for support  
by National Grid

# 1.0 Executive Summary

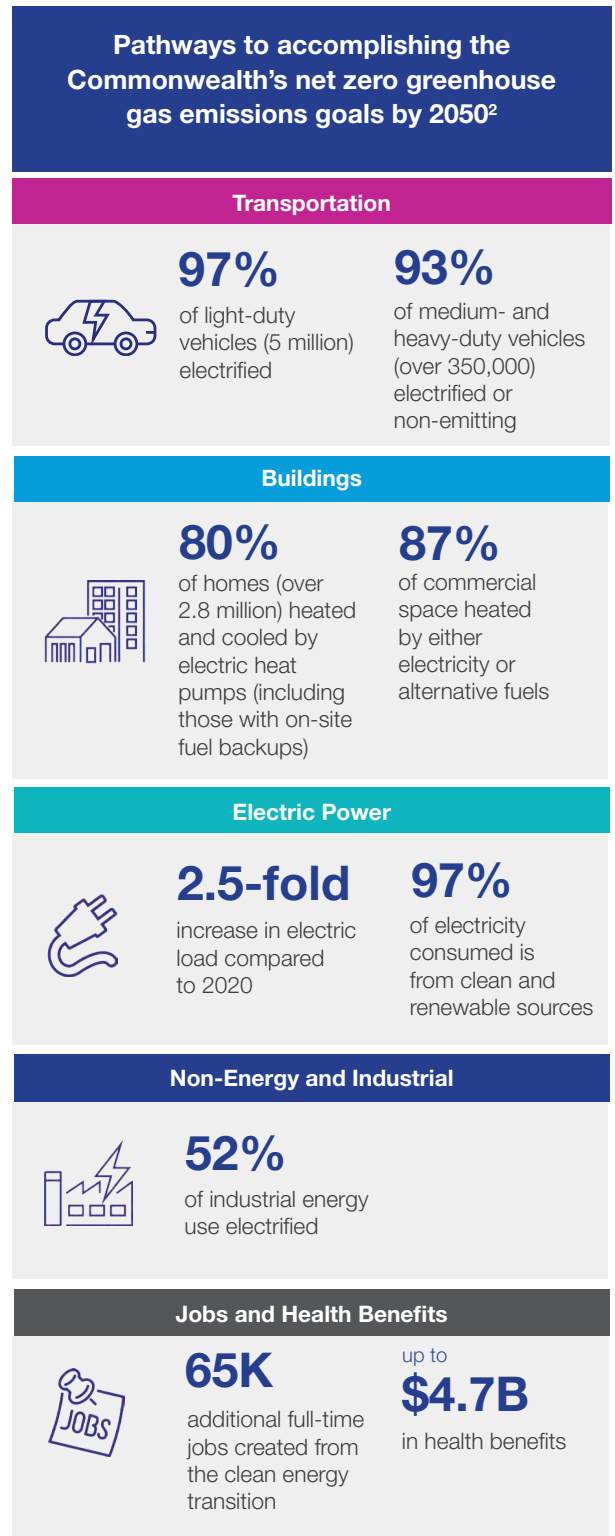
## Overview

Massachusetts’ ambitious 2050 Clean Energy and Climate Plan (CECP) establishes nation-leading goals and supports pathways to reduce climate pollution and reach net zero greenhouse gas emissions by 2050 – goals we share at National Grid. The CECP is an equity-centered plan rooted in decarbonizing the electricity consumed by all customers.

Today, the natural gas network in Massachusetts carries three times as much energy at peak as the electric network, mostly to meet heating needs, with delivered fuels, such as heating oil, also playing a critical role. At the same time, internal combustion vehicles represent almost all vehicles on the road and rely on an established and ubiquitous fueling network that took more than 100 years to build. Making this shift from a multi-fuel energy system to one primarily reliant on electricity will require a major grid build-out, which must start now.

Achieving the Commonwealth’s climate, clean energy, and equity goals requires a comprehensive, thoughtful, and flexible plan to expand and upgrade today’s electric grid at a significant pace and scale to enable increased electrification and move away from a fossil-based economy. To support this future, the electric grid must be fundamentally smarter, stronger, and cleaner in order to:

- ▶ Deliver necessary and timely emission reductions
- ▶ Be ready when customers need it, and be reliable and resilient, regardless of changing weather
- ▶ Enable the deployment and optimized use of new, electrified end-use technologies like heat pumps and electric vehicles and quickly connect distributed technologies like solar and battery storage
- ▶ Provide a more equitable, individualized, and seamless experience for all customers
- ▶ Drive innovation, economic opportunity, and growth, prioritizing communities that have historically been burdened and left behind by the fossil-based economy

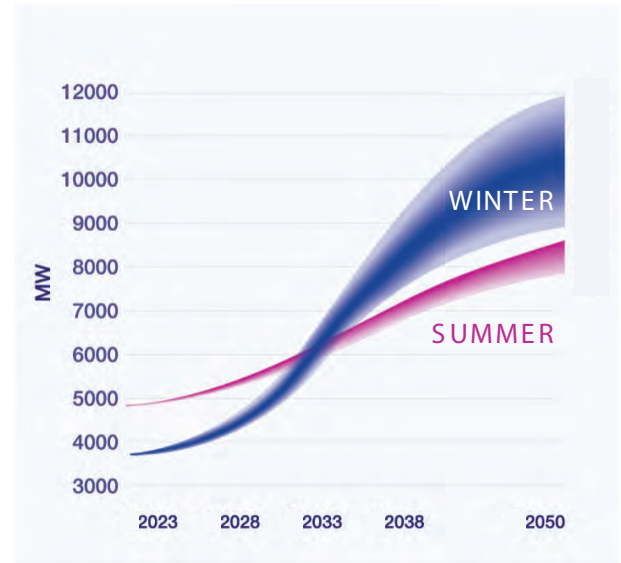


<sup>2</sup> These are statewide goals from the Clean Energy and Climate Plan (CECP).

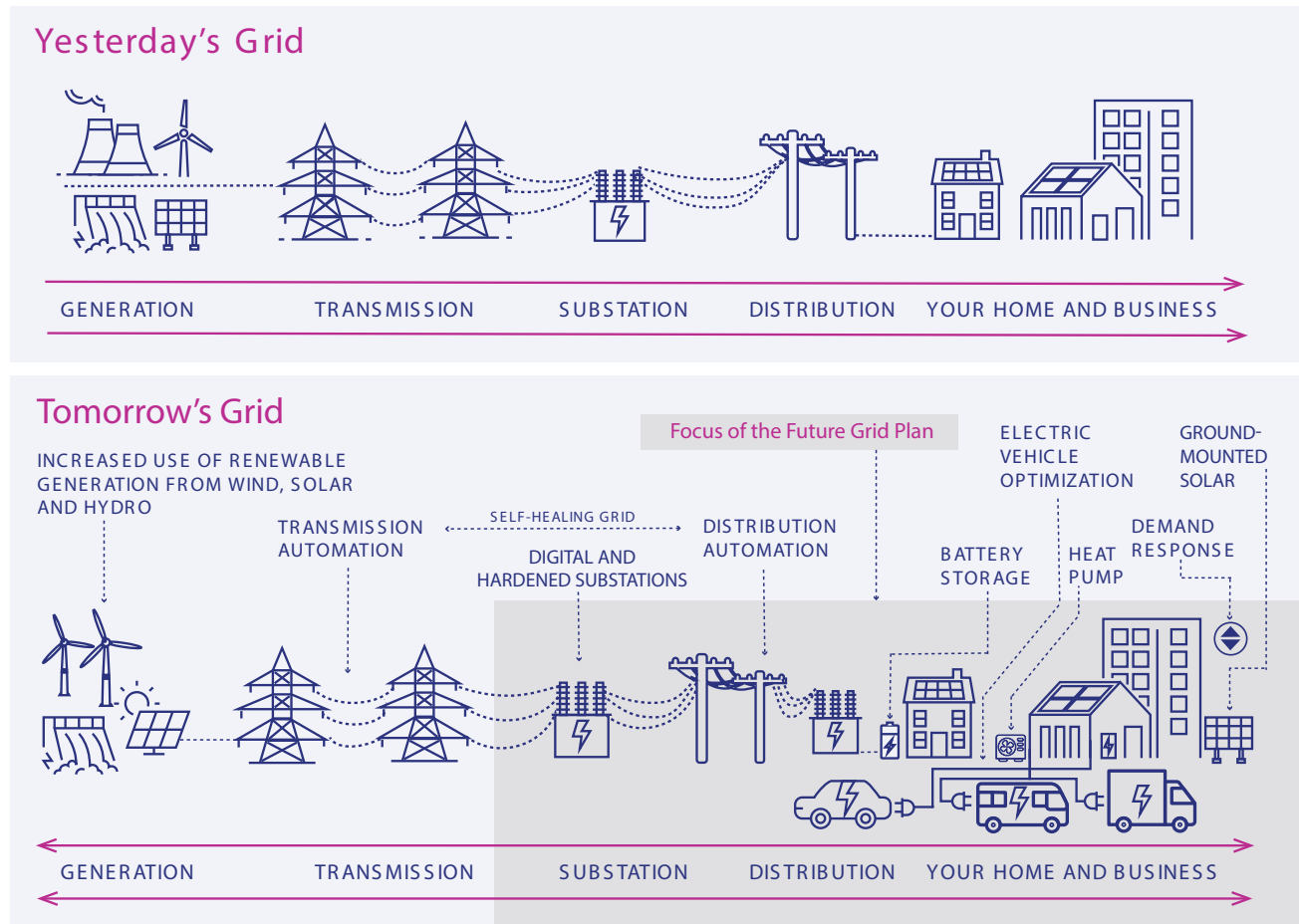
To meet Massachusetts' statewide goals by 2050, the grid of tomorrow must meet peak customer demand more than twice as high as today's, with the peak occurring in the winter as opposed to summer. It must also connect at least twice the amount of energy storage, 10 times the amount of renewable energy, 75 times the number of EVs, and 100 times the number of heat pumps than we see today.

The Company's Future Grid proposal will transform the distribution grid of the past into a smarter, more resilient two-way electricity superhighway that powers sustainable communities today and into the future and provides all customers the opportunity to participate in and benefit from the clean energy transition.

*MECO's peak demand will more than double, and shift to the winter*



### The Commonwealth's Power Grid—Yesterday and Tomorrow





## Massachusetts is a clean energy leader

The Commonwealth has already made significant strides towards enabling this clean energy future. Over the past decade, Massachusetts has achieved electric energy savings of more than 2% of total sales per year, saving customers billions of dollars, and avoiding thousands of tons of greenhouse gas emissions. We have gained over 4 gigawatts (GW) of solar power, enough to power 700,000 homes, more than any other state in New England. The Commonwealth has supported investments in local distribution grids, which has resulted in National Grid maintaining systemwide reliability at 99.9% for our customers and supported steps to modernize and prepare the grid for the impacts of climate change. And it did all this while also advancing energy equity and climate justice through policy, programs, and practice.

Much of this progress has been driven by legislation, including An Act Driving Clean Energy and Offshore Wind (Act), which was enacted in 2022. This Act directed each Massachusetts electric distribution company (EDC) to file an Electric Sector Modernization Plan (ESMP) that identifies “upgrades to the distribution system — and where applicable transmission system — needed to meet the Commonwealth’s climate and clean energy goals over three planning horizons: 1) a 5-year forecast, 2) a 10-year forecast and 3) a demand assessment through 2050.”

## The Company’s Future Grid proposal builds on the Commonwealth’s earlier work

This Future Grid Plan (Plan) proposal serves as the Company’s ESMP submission: it provides a roadmap for how the electric system will operate in the future while outlining the supporting investments needed over the next 25 years. This proposal builds on investments already underway to modernize the grid and complements the investments the Company continues to make to provide safe and reliable service to our 1.3 million electric customers throughout the Commonwealth, as adjudicated and approved in our periodic base rate reviews at the Department of Public Utilities (DPU).

The additional Plan investments, beyond those approved and planned today as part of our core investments, will be across all aspects of our distribution business — network infrastructure, technology and communications platforms, and customer programs — and all regions of the Commonwealth. To be successful, the Plan requires ongoing coordination with the Commonwealth, the state’s other EDCs, and local gas distribution companies (LDCs) to integrate our energy planning efficiently and cost-effectively transition to a more electrified economy. It will also require policy changes to accelerate the build-out needed to support this clean energy future and ensure a just transition.

The Company’s proposed Plan aligns with what we heard from customers and communities as part of our extensive engagement process, which included outreach to our National Grid Customer Council composed of residential and commercial customers, and to public officials, businesses, clean energy groups, nonprofits and community groups representing Environmental Justice Communities (EJCs).

### The Future Grid Plan is rooted in a strategy that:

- ▶ Empowers customers to act by having more choice and more control
- ▶ Creates a ready, robust, and resilient energy system
- ▶ Leverages innovation, drives efficiency, and enables greater system flexibility
- ▶ Results in a more just and equitable energy future

## The Company's Future Grid Plan achieves the Commonwealth's goals through investments to make the grid smarter, stronger, and cleaner

Over the next five years, the Company proposes to invest more than \$2 billion through the Future Grid Plan to meet the Commonwealth's electric-based approach to achieving net zero emissions and enabling the just transition. This future is reliant on a grid that is smarter, stronger, and cleaner to enable expanded energy efficiency and demand response programs through, for example, Mass Save®, advance the smart electrification of transportation and heating, and connect and integrate renewables and storage, at all levels and in all communities.

In developing our proposed Plan, we established five key outcomes to ensure that these incremental investments were carefully scoped to meet specific needs, based on forecasted demand, known and anticipated system capacity and operational needs, and customer expectations and requirements.

Ready

Reliable

Resilient

Flexible

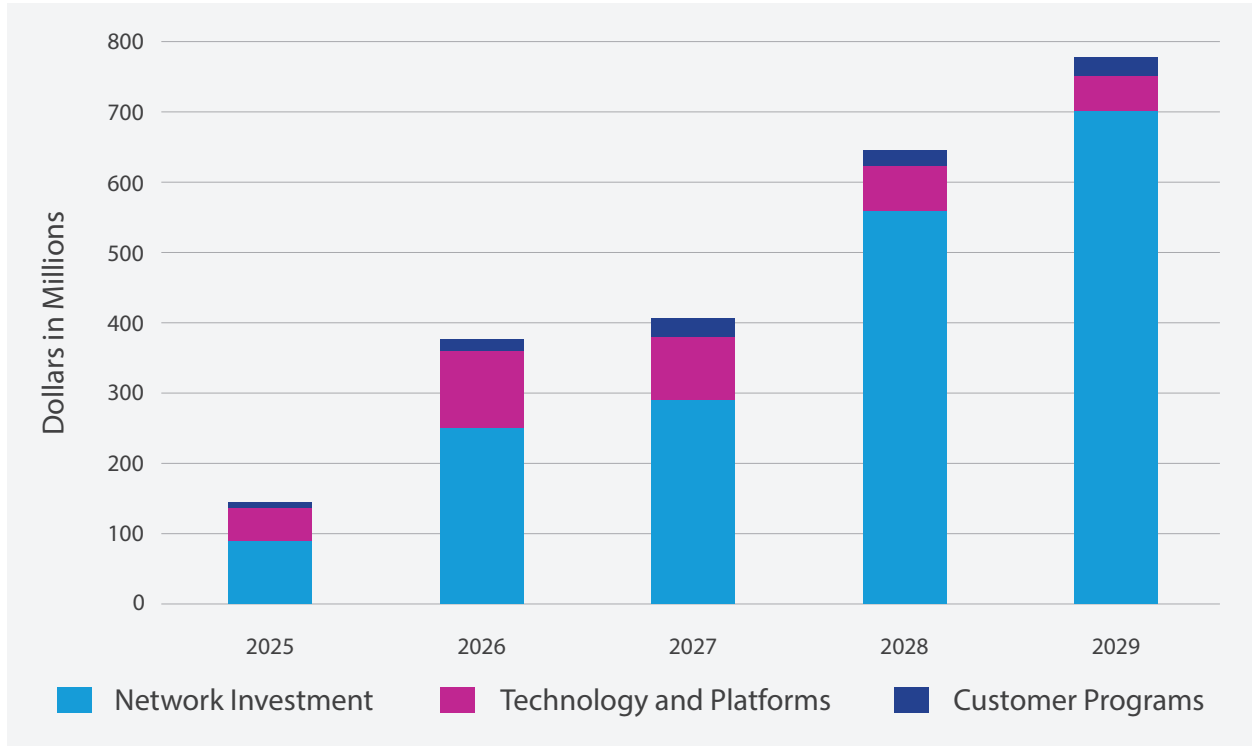
Efficient

We are proposing to move away from a planning and investment approach that lags customer need and impedes technology deployment to one that anticipates and enables it. It takes a smarter, forward-looking view of system capacity and operational needs, on both a systemwide and a localized basis, to build sufficient capacity and resiliency and avoid the need for future investment. For example, to meet the Commonwealth's goals in the timeframes contemplated requires the accelerated adoption of electrified end use technologies powered by clean electricity. The grid therefore needs to be ready and the capacity available when customers choose to act and clean energy developers choose to invest – eliminating the lag they currently experience, which delays or deters this investment. This forward-looking, smarter approach to distribution system investment, on both a systemwide and localized basis, will create efficiencies in planning and capital deployment, provide opportunity for proactive community engagement and involvement, and ensure that no customer is left unserved as we move to a more electricity-reliant future.

We reviewed investments across three key areas:

- ▶ **Network Infrastructure**, such as new and upgraded power lines, transformers and substations to make them stronger, more resilient, and ready to connect and accommodate more clean and distributed energy and electric growth;
- ▶ **Technology and Platforms**, such as new planning tools, systems, and processes to drive smarter decision-making and customer action. This includes installing state-of-the-art data and monitoring systems to provide greater visibility into how the grid and interconnected devices are operating to ensure system safety and stability, and upgrading IT systems and communications networks to accommodate two-way information flows, and provide greater system flexibility and more timely information to support new customer tools and options; and
- ▶ **Customer Programs**, such as new programs and pilots to help customers better manage costs, drive smart energy use, and build community resilience and agency.

### Proposed National Grid ESMP Investments 2025-2029



While the investments necessary to deliver this system will be significant, they are critical to meeting the Commonwealth’s bold climate goals. Throughout the transition, the Company will continue to identify and pursue ways to efficiently deliver this clean, fair, and affordable future, including through the use of, for example, time-variable rates (TVR), energy efficiency, demand response and other forms of non-wires alternatives, so that we build only what is needed, where it’s needed.

#### **Achieving the just transition will require working together to make change**

The Company recognizes that there are challenges associated with delivering the Commonwealth’s ambitious climate and electrification goals, particularly within the time frames and pathway established by the CECP. These challenges include securing a trained and skilled workforce, maintaining an affordable and timely supply chain, and making changes to underlying regulatory policies, mechanisms and processes needed to execute this future. To manage the associated deliverability risks, the Future Grid proposed Plan prioritizes investment based on current system performance, distribution engineering planning needs, and execution strategy.

## Meeting CECP goals requires policy action in four key areas to enable needed investments

### ▶ **Anticipatory Planning and Investment**

Policies that enable and encourage utilities to build out the network so that the capacity is available, and the system is ready when customers need it. This shift will also allow utilities to plan for and train the necessary workforce and secure the necessary supply chain in what is an extremely competitive marketplace.

### ▶ **Permitting Reform**

Policies that improve transparency and accessibility, provide greater agency to potential host communities, and create a more predictable and timely applicant process are needed. This includes establishing a one-stop shop approach to permitting, with clear and understandable standards and engagement practices that project applicants must meet to enable the more rapid delivery of critical infrastructure investments.

### ▶ **Environmental Justice**

Policies must address both procedural and distributional equity, including expanded assistance programs to improve affordability of energy bills, and improved intergovernmental coordination to better serve impacted communities' total needs, while ensuring they have the resources to fully participate in the clean energy transition.

### ▶ **Demand Flexibility and DERs**

Regulatory and tariff changes that enable time-varying rates and recognize the shift toward greater electrification are required to support more impactful offerings to offset peak demand growth with increasingly flexible loads and expanded deployment of distributed resources.

Given the scope and scale of the investment, continued stakeholder participation and input are vital to ensuring a collaborative approach. Our collective efforts must address the needs of all customers and end the cycle of overburdening EJCs and instead use this moment as an opportunity to take restorative action. The Company recognizes that we cannot succeed unless every community across the Commonwealth is engaged and included in the process, is empowered by the clean energy transition, and fully understands the investments and actions necessary to make it a reality. This public engagement effort is already well underway and will continue.

The Company also sees significant opportunities to create real customer value and economic, societal and community benefits, particularly for EJCs, through job growth, increased tax revenue for local communities, and economic expansion by building a clean energy ecosystem that drives competitiveness and growth and reduces climate pollution. Taken together with the Company's earlier investments in grid modernization, energy efficiency and transportation electrification, we believe that total benefits will well exceed costs in meeting the Commonwealth's energy and climate goals.

The Company's Future Grid Plan will deliver a stream of customer and community benefits

By 2030, jobs and other economic benefits, including:

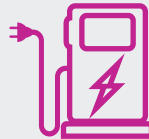


**11K**  
Full- and part-time jobs



**1.4B**  
Incremental economic output

By 2035, 4 GW of new system capacity, enabling:



**1.1M**  
EVs



**750K**  
Heat pumps

We recognize that we are foundational to achieving this new energy future, and that we cannot do it alone. We are committed to working collaboratively with policymakers, regulators, customers, communities, technology providers, and others to deliver a just energy transition for Massachusetts.

Together, we can make it happen.

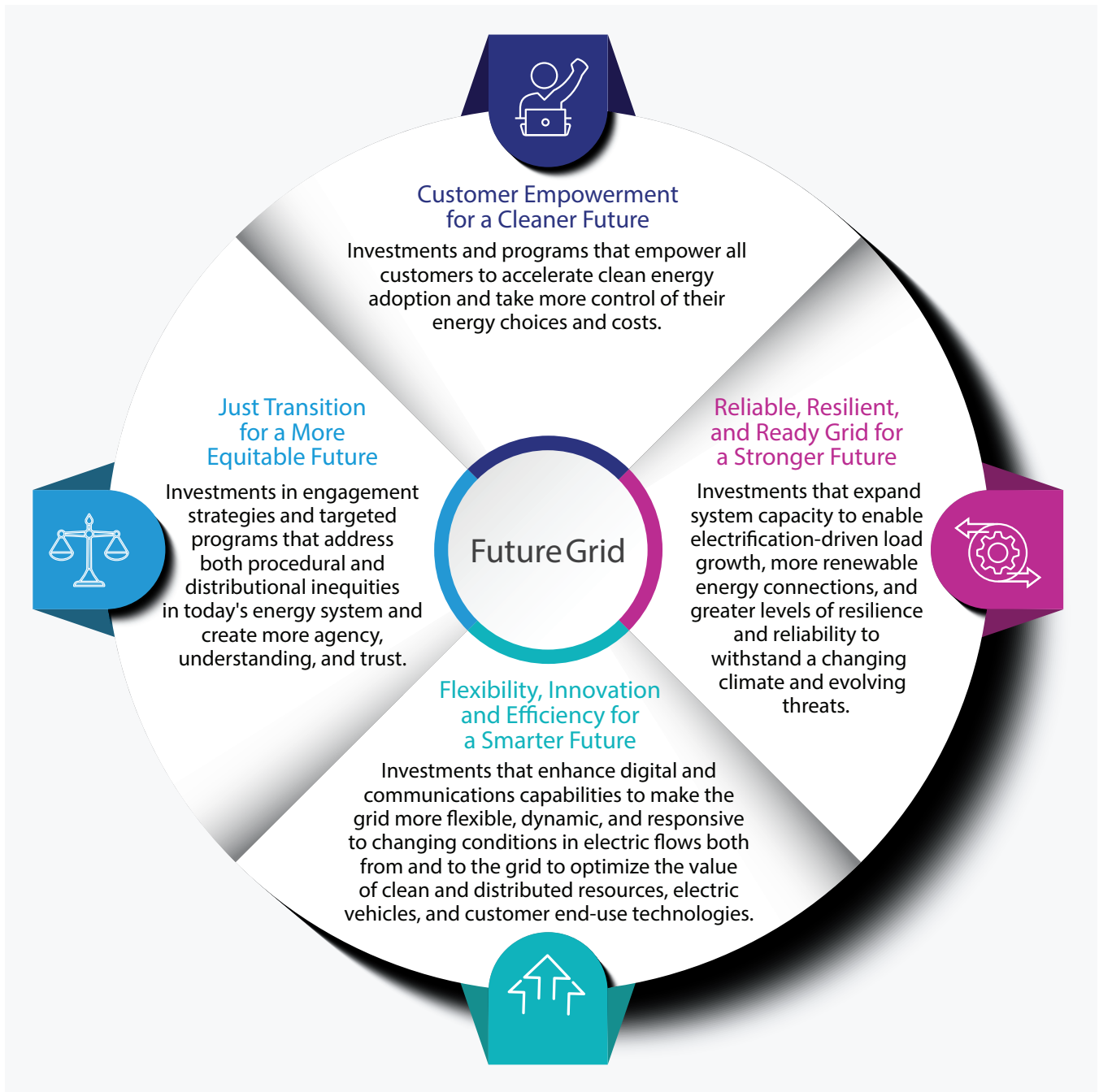
## 1.1 Vision: Enabling a just transition to a reliable and resilient clean energy future

National Grid's vision is to be at the heart of a clean, fair, and affordable energy future for all our customers and communities.

At its core, the clean energy transition in Massachusetts is about re-imagining the future of the electric system, its relationship to customers and communities, its capabilities and opportunities, and the corresponding regulatory paradigms necessary to ensure we are proactively building the smarter, stronger, cleaner network needed to achieve desired outcomes, which include:

- ▶ Empowering customers to make the smart clean energy choices that work for them;
- ▶ Creating a ready, reliable and more resilient grid capable of withstanding more extreme weather;
- ▶ Leveraging innovation, driving efficiency, and enabling greater system flexibility; and
- ▶ Enabling a more just and equitable energy future to ensure benefits for all.

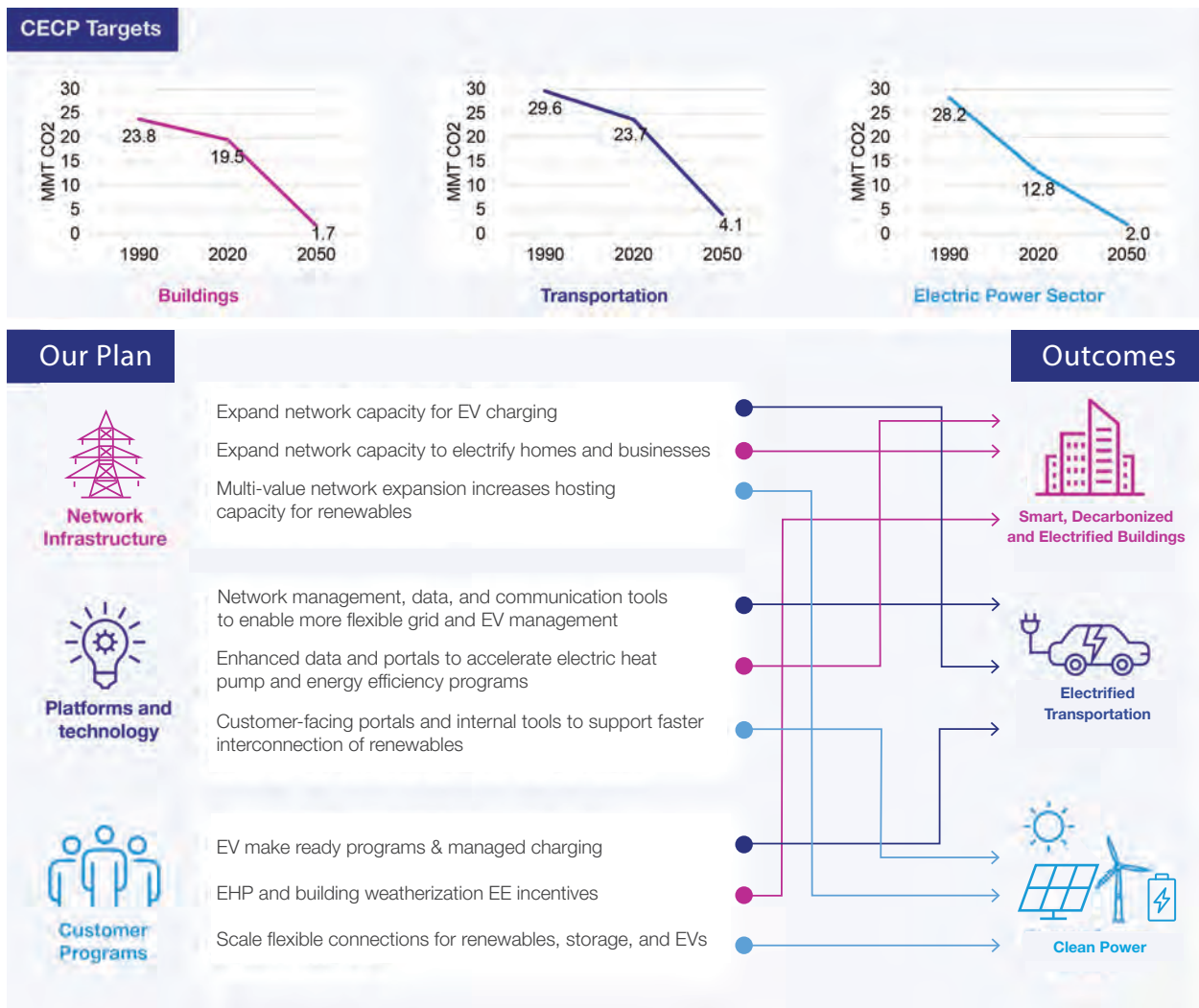
National Grid's approach to the clean energy transition starts with the customer—understanding their evolving energy needs, giving them more information and more choices, and supporting their side of the clean energy effort through programs, rates and other offerings. It then establishes the investment pathway necessary to meet these needs, using specific criteria to assess and develop the required investments in network infrastructure, technology platforms, and customer programs. The resulting investments will make the grid smarter, stronger, and cleaner, and will empower all customers to adopt clean energy technologies at the pace and scale needed to meet CECP goals. The graphic below summarizes our Future Grid vision.



## 1.2 Plan overview and alignment with the Clean Energy and Climate Plan

The 2050 CECP is the Commonwealth’s plan to achieve economy-wide net zero greenhouse gas emissions by 2050. Future Grid is National Grid’s plan to deliver an electric network that meets the goals of and is consistent with the CECP. The graphic below illustrates at a high level the CECP’s sectoral emissions reduction goals, and how our proposed Plan’s elements map to those goals.

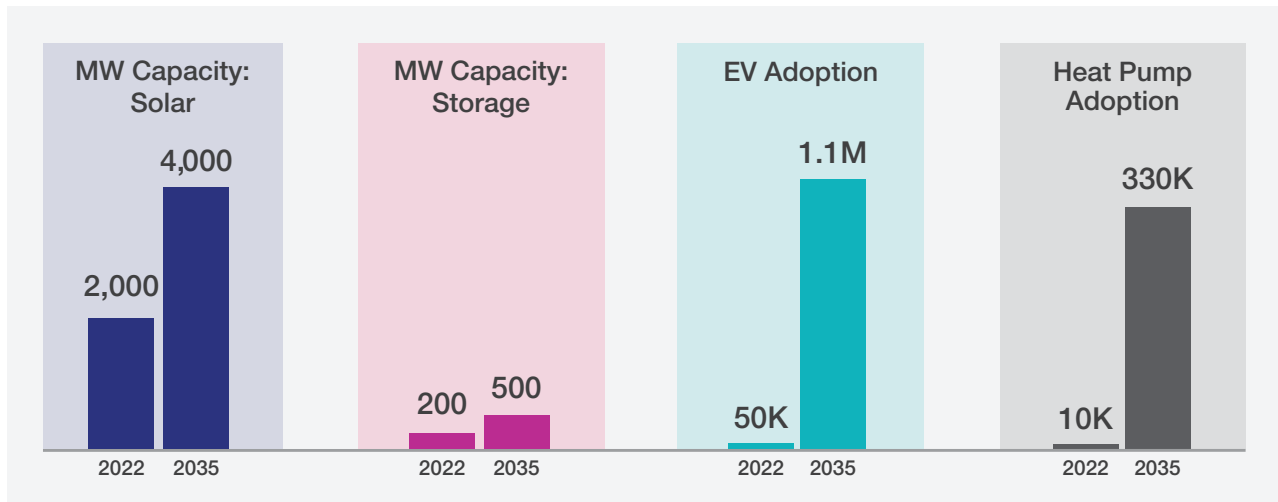
### How The Company’s Future Grid Plan Elements Map to CECP Goals





Meeting these ambitious targets requires building an electric system that can support increasing amounts of intermittent renewable generation capacity and significantly increased electricity consumption in the transportation and buildings sectors resulting from policies that drive electrification. The graphic below provides selected growth projections by technology through 2035 that the grid must be able to accommodate on the path to 2050.

*Solar, storage, EVs, and heat pump adoption is expected to soar by 2035 and the grid must be ready\**



\*These are approximate values



## How National Grid Will Meet the CECP Targets

National Grid will help Massachusetts deliver on its CECP targets for the transportation, buildings, and electric power sectors by investing in three key areas:

- ▶ **Network Infrastructure**, such as new and upgraded power lines, transformers and substations to make them stronger, more resilient, and ready to connect and accommodate more clean and distributed energy and electric growth;
- ▶ **Technology and Platforms**, such as new planning tools, systems, and processes to drive smarter decision-making and customer action. This includes installing state-of-the-art data and monitoring systems to provide greater visibility into how the grid and interconnected devices are operating to ensure system safety and stability, and upgrading IT systems and communications networks to accommodate two-way information flows, and provide greater system flexibility and more timely information to support new customer tools and options; and
- ▶ **Customer Programs**, such as new programs and pilots to help customers better manage costs, drive smart energy use, and build community resilience and agency.

These investments will support expanded energy efficiency and demand response programs, smart electrification and the connection of renewable energy and energy storage at all levels.

Accordingly, the Company's Future Grid Plan outlines the steps we need to take over the next five, 10 and 25 years to achieve our collective goals. Because the Company took a long-term view of the investments required, it was able to anticipate the system needs for electrification forecast to occur beyond a typical 10–15-year study horizon. The investments included in this Plan are prioritized based on forecasted demand, known and anticipated system capacity and operational needs, and customer expectations and requirements. Absent this long-term vision, the Company in many instances would have needed to make successive investments in an asset or area, to react to electrification load growth and clean energy deployment, as it materialized. This approach would result in less cohesive solutions, and delays in meeting customer and community needs. Instead, through this Plan, the Company is proposing a smarter, more efficient approach with more anticipatory investments scaled to the needs of an electrified and decarbonized Commonwealth.

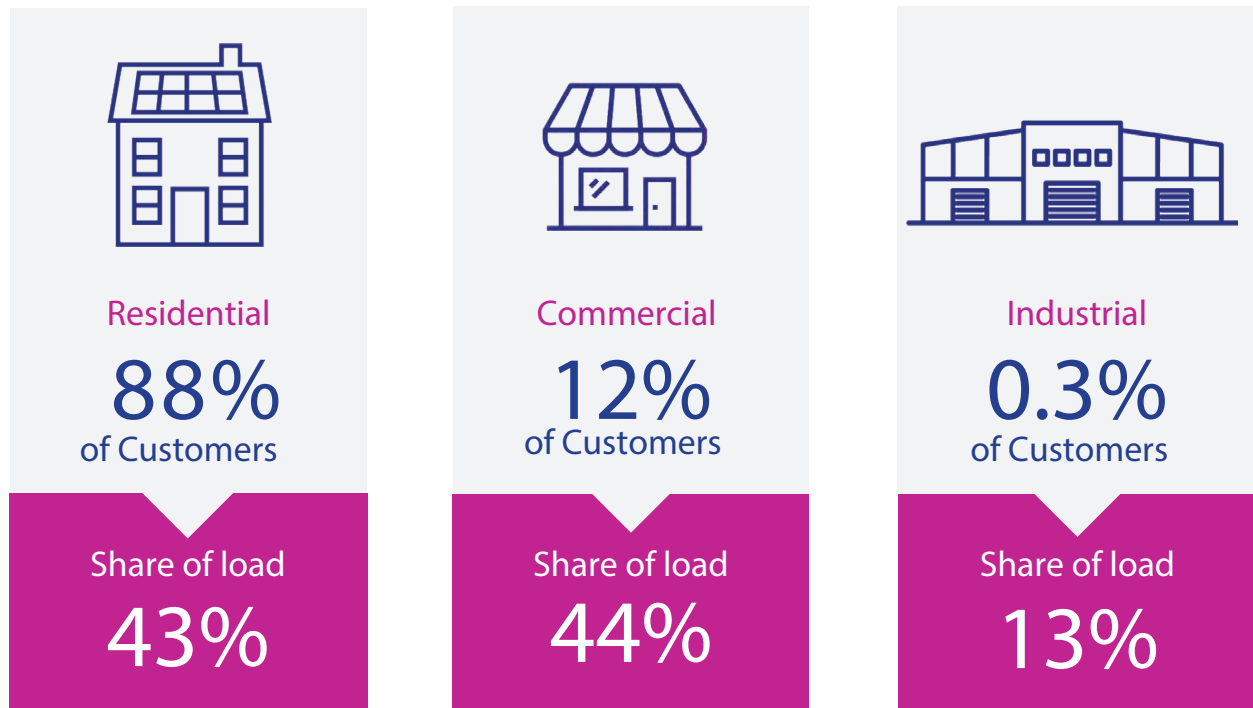
## 1.3 Service area overview (customers, load, transmission, distribution, generation)

Our customers and communities are at the foundation of what we do and why we do it, and they are critical to the success of the Commonwealth’s decarbonization plans and achieving the GECP goals.

### Customer Characteristics

Today, National Grid provides safe and reliable electric service to more than 1.3 million customers in 168 towns and cities, across a service area that spans nearly 3,870 square miles — from the Berkshires to Brockton and Cape Ann to Cohasset. We are the electric provider in many of the Commonwealth’s Gateway Cities and we serve many environmental justice communities, representing customers in towns such as Adams, Worcester, Somerset, Lowell, Lawrence, Lynn, and others. We serve rural, suburban, and urban areas — including coastal and mountainous communities. Our customers live in single-family homes, multi-family homes, and apartment buildings. They run farms, small retail businesses, restaurants, grocery stores, food processing facilities, and more. They include municipalities and schools, ports and transportation hubs, academic institutions, manufacturing facilities, hospitals, healthcare, and life sciences. The graphic below summarizes our customers by major type and percentage of total load served.

### National Grid Customers



While 88% of our customer base is comprised of residential customers, nearly 60% of the electric demand is driven by commercial and industrial (C&I) customers. Each customer segment has unique needs; and they are evolving. While residential customers' demand is lower than C&I, their needs are growing and the complexity and breadth of services and offerings they are asking for is following suit. For example, as more customers adopt behind-the-meter solar and storage, even though their overall electricity supply needs may decline, their use of and interaction with the grid and related services will increase. Similarly, as more C&I customers electrify fleets, their system use patterns and demand profile are changing, as well.

### System Characteristics

To serve our diverse customer base, National Grid operates and maintains an electric system that consists of more than 2,500 miles of electric transmission lines. These transmission lines carry electricity long distances at high voltage levels to 149 transmission substations that serve a critical function of stepping down this power to a lower voltage and make it safe to carry it across 18,500 miles of smaller electric distribution lines, which are supported by hundreds of thousands of poles and 178 strategically located distribution substations in our six sub-regions. As the power flow of the network increases, the capacity of the substations must also increase to accommodate this growth. Substations play a pivotal role in stabilizing the entire electric network and maintaining safe and reliable service. Lower voltage electricity is distributed from the substation across a series of lower voltage circuits or wires, which can run overhead or underground. This power is then stepped down again at smaller transformers close to homes and businesses so that it can be safely delivered to customers. This extensive network will need to nearly double in size and capacity over the next twenty years, including adding a substantial number of new substations and expanding others, to meet our customers' future needs, and achieve the CECP goals.

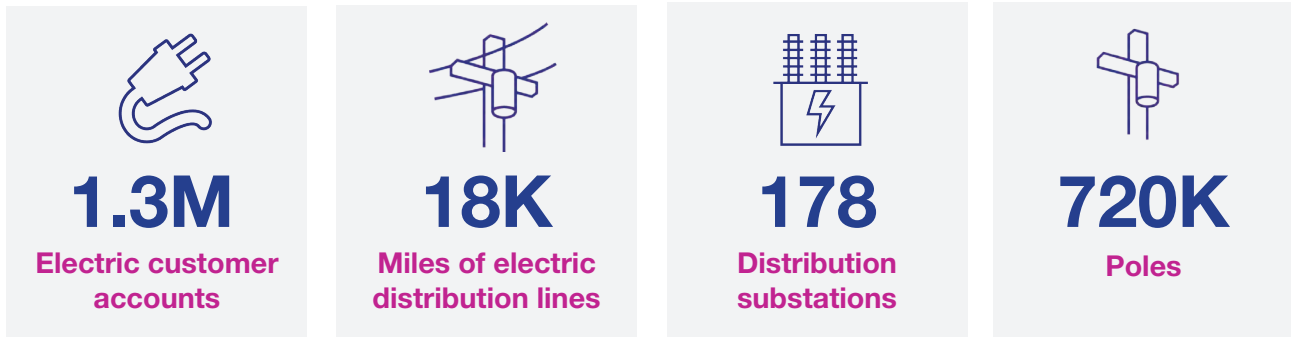
In 2022, the Company's system carried electricity generated by solar, wind, hydro, nuclear, biomass and fossil fuels to meet 19,000 GWh of electric demand (1/3 of the state's total electric demand) and supported a maximum hourly demand of 4.7 GW. Our electric network also enabled the interconnection of 150 MW of solar and 50 MW of storage and supported a broader total of approximately 2 GW of DERs, including behind the meter resources like storage and solar on homes and businesses — more than any other EDC in the state and second most per square mile in the country.

For those customers that do not receive generation service from a third-party supplier or municipal aggregator, we purchase it on their behalf via the competitive wholesale power market and pass it along without profit or markup. The mix of generation we procure from these suppliers to deliver to customers will change as more and more of the power we purchase comes from renewable sources, such as offshore wind, hydro, and solar, enabling the Commonwealth to meet its goal of 97% of all electricity delivered coming from clean energy sources.



[Click here for an explanation of how the grid works.](#)

## National Grid Summary Statistics



Our interconnected network is kept in balance by our operations control centers which monitor and manage the network 24/7/365. The control center is the “orchestrator” of the network with real-time visibility into network conditions and is responsible for dispatching assets and field operations crews as needed in response to grid conditions. The role of our control center, and the teams that operate it, is changing with the accelerated adoption of DER and electrification across the network.

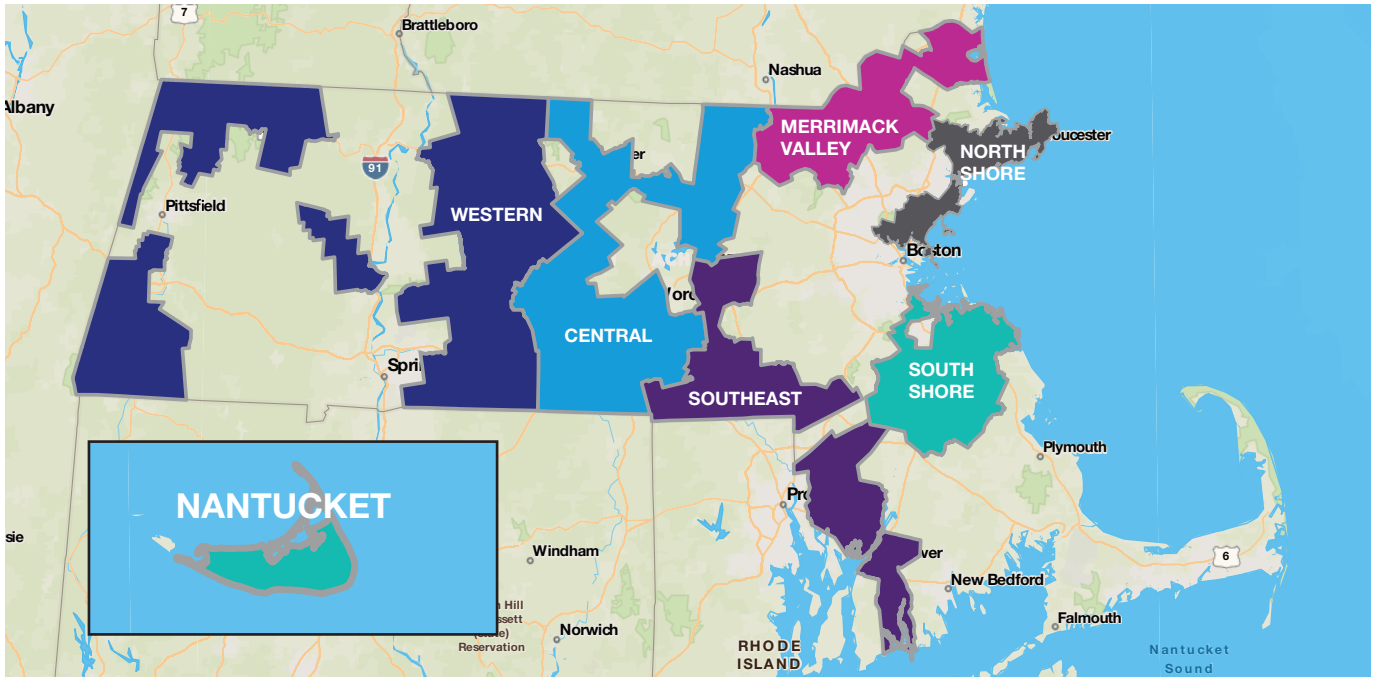
We are equipping our control centers and team members, accordingly with new tools, processes, and resources to operate a more dynamic and reliable network that leverages DERs as providers of grid services both at the distribution level and to the Independent System Operator of New England (ISO-NE) wholesale markets via Federal Energy Regulatory Commission (FERC) Order 2222, which will create additional value streams for resources like distributed solar, behind-the-meter storage, managed charging, and demand response.

### Our community characteristics drive today’s system and tomorrow’s investments

The diverse communities we serve have unique physical, economic, and historical characteristics that informed the Company’s previous planning criteria and impact our operation in those areas today. For example, some communities previously supported the Commonwealth’s textile and manufacturing economy, while others had limited economic activity. Some rural areas are now becoming suburban, and urban areas that once thrived may have experienced limited growth for a long time. The results of these varied and uneven economic development and settlement patterns across our service area means that existing infrastructure and system capacity are varied and uneven, as well.

This foundation shapes and informs the investments needed to enable the clean energy transition and build resilience in each community. As we developed our Future Grid Plan, we took both a granular and high-level view of our system breaking it down into different distribution regions. These groupings are based on both geographic proximity and electrical system characteristics which facilitate effective system planning and engineering analysis. The map on the following page provides an overview of these six regions.

### National Grid's Six Major Service Sub-regions

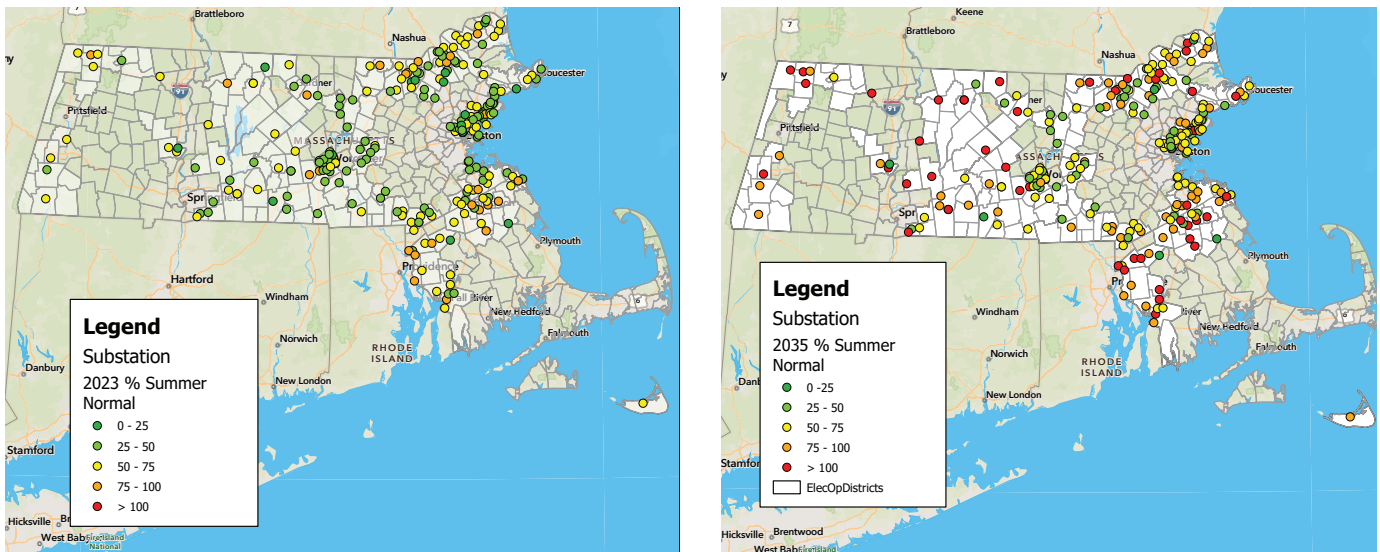


The Company analyzed the current demand, future needs, and existing system capacity in each of these regions. The maps below show that without system upgrades, by 2035 every region in our system will see forecasted demand exceed current capacity. We therefore need to invest in expanding and upgrading our electric delivery infrastructure in every region over the next 5, 10, and 25 years.

The scale, scope, timing and exact locations of these investments will be driven by a combination of factors, including 1) the physical and operational needs and the condition of the infrastructure used to serve these regions, 2) the available capacity on the local electric network to meet future electric needs and enable local, distributed energy resources like solar and storage, and 3) the current performance of the local energy network as it relates to reliability and resilience.

The map below illustrates the contrast between today's current loads vs. system capacity across our service area and sub-regions, and the projected gap between forecasted loads and current capacity in 2035. The 2035 projections show no system expansion investments; this provides a baseline for examining alternatives as we worked through the planning process applying our ESMP driven outcomes of ready, reliable, resilient, flexible, and efficient. Section 4 provides more detailed information.

*Substation load as a percentage of capacity across the Company's system, 2023 vs. 2035 forecast, assuming no capacity expansion*



**Without system upgrades, by 2035 every sub-region in our system will see forecasted demand exceed current capacity.**

## 1.4 How our customers will experience the clean energy transition

The future electric system will power not only the appliances, electronics, lighting, and cooling systems it serves today, but also the cooking of food, the heating of buildings, and the transporting of goods and people. Today, our customers rely on and use electric, gas, and delivered fuel networks to meet their home and building energy needs, and a vast network of fueling stations for their cars, buses, and trucks. In the future, customers will become much more reliant on the electric network to power all aspects of their lives and work. They will experience a future electric network that is more decarbonized, more distributed, more digitized, more decentralized, and even more necessary to them.

National Grid customers are increasingly aware of this future and engaged in their energy experience and the role energy plays in their day-to-day lives. As a result, they have high expectations for levels of service and options. They want immediate solutions when problems arise, when outages occur and when opportunities emerge. Rising prices, supply security concerns and climate change are front of mind. There are more active energy consumers seeking more interaction, driving a greater need for change in the customer experience. Each customer has their own unique needs, depending on a variety of factors, including customer type, electric use patterns, geography, income, and access to technology and capital.

We also know that affordability and equity mean different things to different customers. For some business customers, for example, electric costs may be a significant share of their overall operating costs, impacting profitability. For some residential customers, paying their monthly electric bill may require hard choices, such as choosing between heating or eating, because their energy burden is so significant. We are aware of these key differences and are re-envisioning how we approach, interact with, and serve each set of customers. This deeper understanding of our customers' diverse needs helps us define the investments needed to: improve operational efficiency; optimize our plans and programs to build only what is needed to meet reliability, resilience, and growth goals; and enable rate designs, energy efficiency, access to clean transportation, and customer and community-facing programs for bill management and other support.

Our customers' and communities' actions will determine the pace and scale of decarbonization in the Commonwealth. National Grid maintains a Customer Council comprised of all customer classes, service area communities, and impacted populations, including EJC's. In anticipation of our ESMP filing, we reached out and asked customers through the Customer Council about their expectations for the future energy system, what they want from the energy transition, and how they want to experience it. This customer feedback is summarized the box to the right and informed our Future Grid proposal.



## Key takeaways from our Customer Council input:

# Build a Grid that Serves Everyone



### Strengthen our system

Create clean energy solutions, fewer outages, and thousands of jobs.



### Keep Costs Down

Make smart investments that improve operational efficiency and enable customers to optimize and create value from energy systems.



### Put Customers in Control

Deliver products and services that put customers in control of their energy future to meet their priorities, not ours.



### Create a Seamless Experience

Continuously modernize our system so all customers can self-serve and more seamlessly access and sign up for products, services, and programs, with particular focus on our low- and moderate-income customers.





For McSwiggan's Pub in Weymouth, building renovations and staffing changes in their 2,400 square foot pub meant that costs were becoming an issue. The owners leveraged free energy assessments and the Company's small business rebate program to save them 73% of the total cost of removing its old HVAC system and upgrading to three new electric heat pumps. They were able to install equipment and connect to our system immediately, meeting their needs in their time frame.

## 1.5 Demand assessment and investment drivers

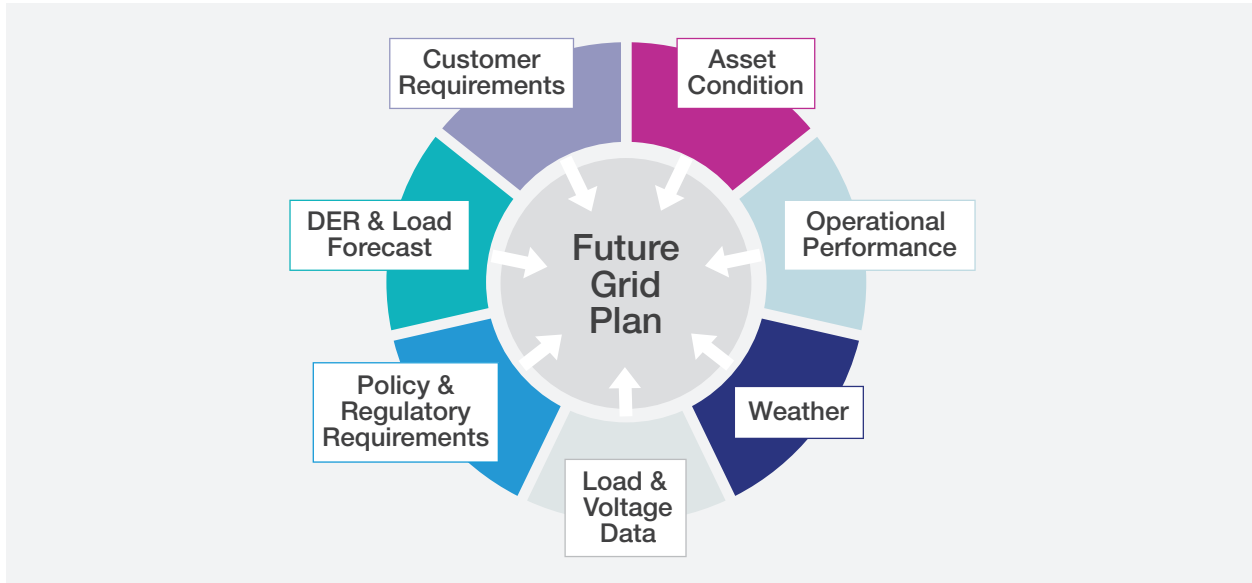
National Grid's system demand forecast is fundamental to meeting the Commonwealth's climate goals. The substantial beneficial electrification of heating and transportation needed to achieve the CECF goals impact the electric demand forecast dramatically, including peak demand and when it occurs, driving the need for infrastructure investment.

National Grid, like Eversource, uses an econometric forecast model to first project a base load estimate, and then incorporates adjustments for policy changes, technology innovation and adoption, customer behavior, and historical load and weather data with other factors to develop a predictive load forecast model. National Grid uses this model and data to run 2000 different scenarios of future electric load growth, including system-level and substation-level peak demand. Both Eversource and National Grid produce system- and substation-level peak 90/10 forecasts, taking the 90th percentile forecast load as the primary planning case. The graphic on the following page illustrates the inputs to our system analysis and modeling process.

### **How is electric demand expected to change in the future?**

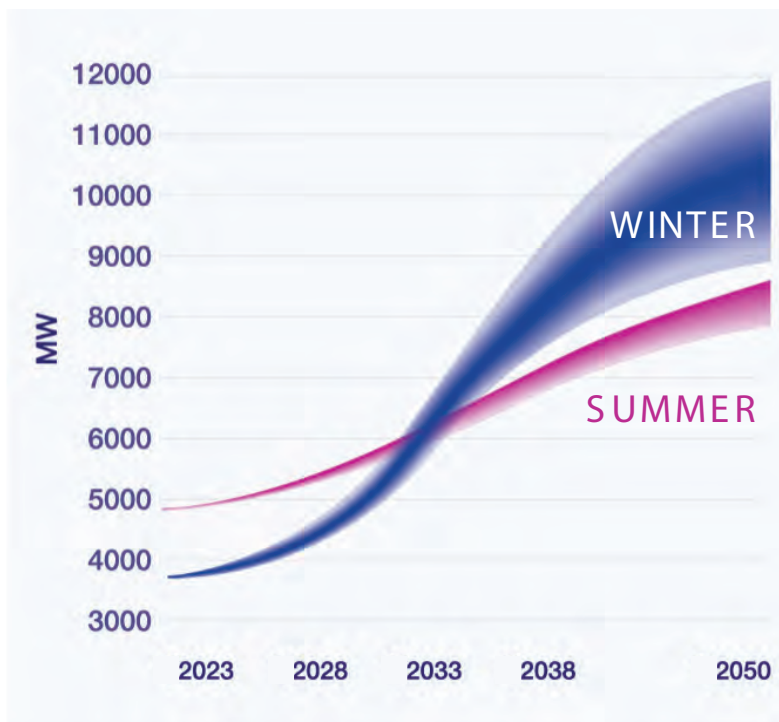
We are at an inflection point on our path to net zero emissions in terms of how customers use electricity. National Grid's electric demand is forecasted to grow at a rate that exceeds historical averages of the past 15 years and outpaces offsetting actions such as energy efficiency, demand response, and solar PV, as electrification in the transportation and buildings sectors creates significant new end-use demand for devices and at times that are different from historical patterns. For example, aggregate demand has remained relatively flat over the last 15 years despite increases in base load.

*Principal inputs to the Company's system analysis and modeling process.*



Over the next 10 years, however, customer usage is projected to increase, on net, at an average annual rate of 1.3% per year through 2029 and then increase to an average annual growth rate of 2.1% through 2034. In the post 2034 period, our total sales assessments anticipate electric demand growing at an annual average rate of 3%. These results of future electric demand are consistent with demand projections of Eversource, ISO-NE and the Commonwealth.

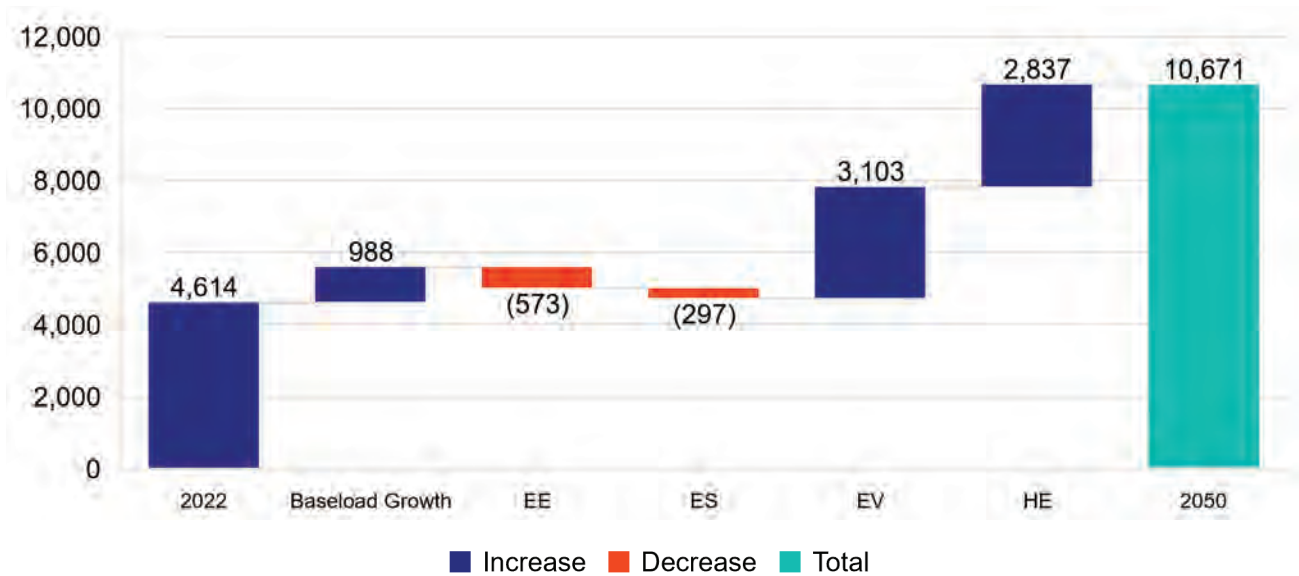
*The Company's peak demand is forecast to more than double by 2050, and shift to winter around 2036*



### How is peak demand expected to change in the future?

Annual peak load, which is the maximum demand on the system in a given year, is expected to grow across our network 7% by 2029 and 21% by 2034 relative to 2022 levels, and more than double by 2050, driven by the electrification of transportation, heating, and industrial processes, as well as increasing air conditioning loads. And, while both summer and winter peak load are expected to grow, the graphic above shows that by 2036 winter peak load will exceed summer peak load, which has implications for system operations and the time of day when peaks occur. The graphic below provides a breakdown of the components of forecast load growth, including the potential impacts of efficiency, DERs, and other factors. See Section 8 for more detailed discussion of the demand assessment.

#### Annual peak load growth through 2050 by components



Our network investments and operational planning both need to change to accommodate these shifts. Enabling and accommodating the growth in electricity consumption from electric transport and heating will need the timely delivery of expanded electric system capacity on both the distribution and transmission networks. Without the necessary investment, accelerated rates of electric end-use technology adoption will outpace the grid’s ability to keep up with demand in a manner that preserves reliability.

## 1.6 Equity focused stakeholder engagement and feedback

Seeking feedback, proactively engaging, and building understanding and trust with stakeholders is critical to achieving the Commonwealth's climate and clean energy goals. These include customers, communities, policymakers, public officials, non-governmental organizations, and technology providers, among others, who are both impacted by and important contributors to a fair, affordable, and clean energy transition. Stakeholder engagement is also paramount to National Grid's ability to successfully develop and execute its Future Grid Plan, given the scope and scale of infrastructure investment needs, which includes the proposed upgrade and expansion of 17 existing substations, and building of 28 new substations more than 30 towns over the next 10 years.

To ensure we are gaining the necessary perspectives to inform our plans and siting decisions, we are taking steps to identify, map and innovate the best ways to engage and communicate with stakeholders on an individual and collective basis and provide more agency in the process. This includes leveraging available resources and forums, starting with the Grid Modernization Advisory Council (GMAC), members of the public, and experts who have participated in the process thus far.

Our approach to stakeholder engagement is rooted in the following:



**Building a shared understanding** amongst stakeholders regarding the electric grid, the goals of electric sector modernization plans, and how these investments will help the Commonwealth meet its climate and clean energy goals.

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**Developing collaboration** by engaging stakeholders and establishing conversations to discuss the insights and initiatives required to deliver a smarter, stronger, and cleaner energy future and just transition, in ways that are relevant to them and meet community needs.

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**Tailoring outreach** and stakeholder engagement plans to support local ESMP projects, elicit and incorporate customer feedback, and identify community concerns and needs. This will include a community-centric, culturally competent, and respectful approach to educate community members about the upgrades being made to the grid and the outcomes and tangible benefits they will deliver, and impacts.

We recognize that as we go about our outreach, solicit feedback, and seek to build trust, we must pursue engagement in a way that keeps communications simple, relevant, and timely, and that is also inclusive, accessible, open, and collaborative. To do this, we are holding direct dialogues and meetings in both facilitated forum and one-on-one settings, leveraging multiple and diverse communication channels through earned and paid media platforms, developing facts sheets and videos translated in multiple languages, and building digital tools such as websites and social content to provide all customers access to information about the ESMP process, National Grid's plans, and ways to provide input.

We are also conducting direct outreach with a focus on customers and communities that traditionally are not fully or formally represented in proceedings at the DPU or in processes like these, including environmental justice and LMI communities and constituencies, municipalities, small businesses, and labor.

In addition, we are leveraging existing data and customer research to better understand the outcomes our customers want and concerns they have as we make the energy transition, including through our Customer Council.

To date, we have met with more than 20 municipalities, 12 business and economic development organizations, including individual members, energy assistance providers, academic institutions, organizations representing generators, renewables, DER providers, EV providers and other technology providers, state officials, housing developers, and members at the EJ Table, which is a statewide coalition formed to inform and support environmental justice legislation and policy in the Commonwealth. (See list included in the Appendices.)

#### **Procedural equity**

**To ensure that stakeholders and communities impacted by energy projects and programs have the necessary information and opportunity to participate in and inform project development and implementation.**

#### **Distributional equity**

**To ensure that the clean energy transition is implemented in a way that drives the more equitable realization of the benefits and burdens associated with the clean energy transition**

To advance and operationalize these tenets as we continue to evolve and implement this Future Grid Plan, National Grid has developed a draft Equity and Environmental Justice Policy and Stakeholder Engagement Framework, which is included in the appendices. We are seeking feedback to this framework from the GMAC and Equity Working Group, among others, and will submit a final framework with our January 2024 filing at the DPU.

#### **Feedback to date has focused on the following principal issues:**

- ▶ **The importance of a deliberate transition, with the need to start engagement and planning with impacted communities and customers early in the process.** This early engagement is needed to ensure that we are capturing and addressing concerns and providing agency in siting decisions, coordinating work with municipalities, and identifying avenues for partnership and shared benefits, particularly for those communities that will either continue to host significant energy infrastructure or will need new investment. This includes working with trusted community partners throughout the process. Additionally, several municipalities viewed the transition as an opportunity to meet multiple goals for clean energy and economic development, by leveraging the process to create clean, electric-ready new business zones in their communities.

- ▶ **The need to maintain an affordable and reliable energy system**, with the recognition that affordability and reliability means different things – and have different implications – depending on customer segment and economic circumstance. The need to focus on the costs of the energy transition to EJC's, more holistically address overall energy burden and raise enrollment in existing affordability and assistance programs was raised several times. Many stakeholders focused on the need to ensure the system was resilient and able to respond quickly to any event, particularly as the economy becomes more electrified. For businesses for which electricity is a critical input, such as life sciences and biotech, power quality was also top-of-mind.
- ▶ **The challenges customers and technology providers have today to interconnect to our system quickly and affordably**, and the need to make it easier to do business with us. This issue was particularly acute for housing, commercial real-estate developers, and DER providers. There is a recognition that National Grid is working to shorten and simplify processes and secure the necessary supply chain, but that more needs to be done, particularly as the pace of electrification and clean energy deployment accelerates.
- ▶ **The benefits of Mass Save and other programs that provide financial and technical support to pursue clean energy and energy efficient solutions**, and the need to expand those programs, such as Community First, and make them more tailored and targeted to individual customer segments and circumstances. Many municipalities are concerned about the costs of the energy transition and ability to participate fully, not only for their own facilities, but also for their constituents.

Going forward, we plan to conduct additional and extensive outreach in advance of our final submission of our Future Grid Plan to the Department of Public Utilities (DPU) in January, including conducting joint outreach sessions with Eversource and Unitil. National Grid and the other EDCs are committed to hosting two stakeholder workshops in the fall of 2023 as part of the ESMP filing process. The fall workshops will be conducted in consultation with the GMAC, be professionally facilitated, hosted virtually, and conducted at times recommended by the GMAC or Equity Working Group, with language translation services. The EDCs will also use these workshops as an opportunity to further educate stakeholders and gain feedback from the voices of the community. We will track and share all recommendations and develop a formalized feedback loop for increased transparency.

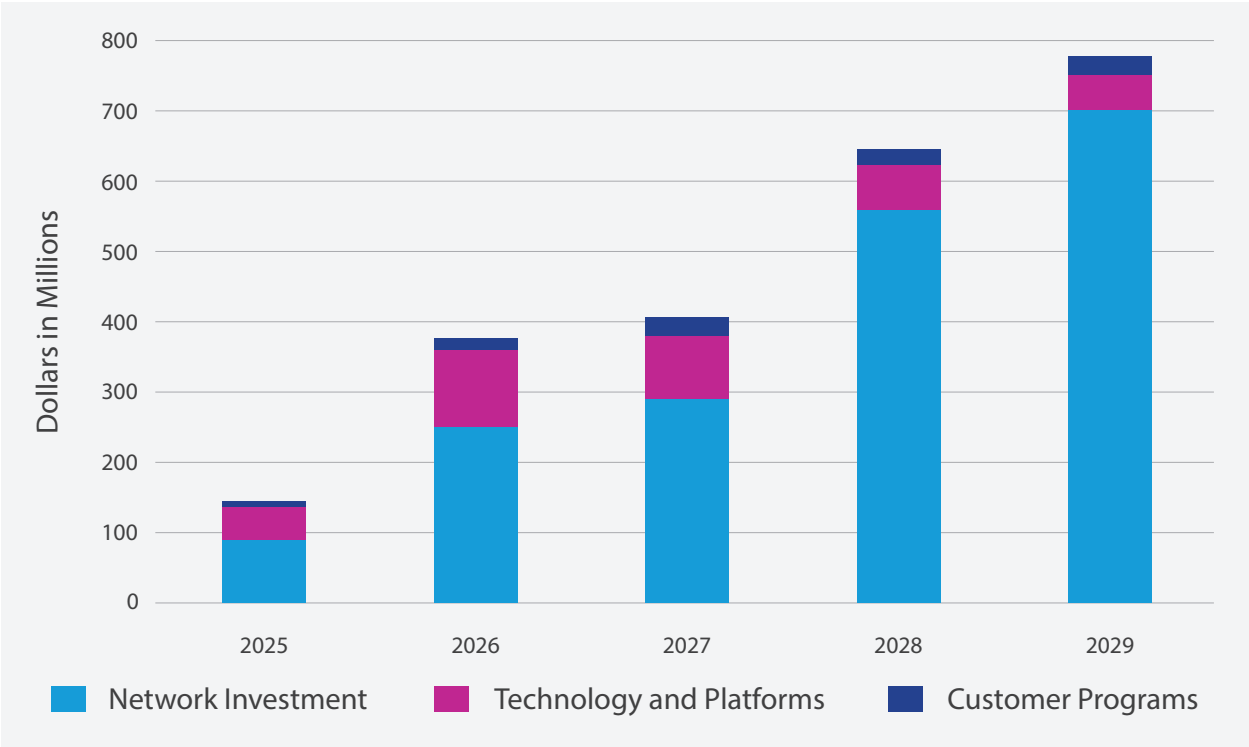
### *Proposed new Community Engagement Stakeholder Advisory Group*

**We are proposing jointly with the other EDCs the development of a new Community Engagement Stakeholder Advisory Group (CESAG) to address historical obstacles to stakeholder engagement and agency and ensure the widest possible level of community participation as we advance substantial investment plans that have a direct impact on and associated benefits to individual communities. Additional detail on the proposed CESAG is provided in Section 3.**

# 1.7 5-year Electric Sector Modernization Plan investment summary and outcomes achieved

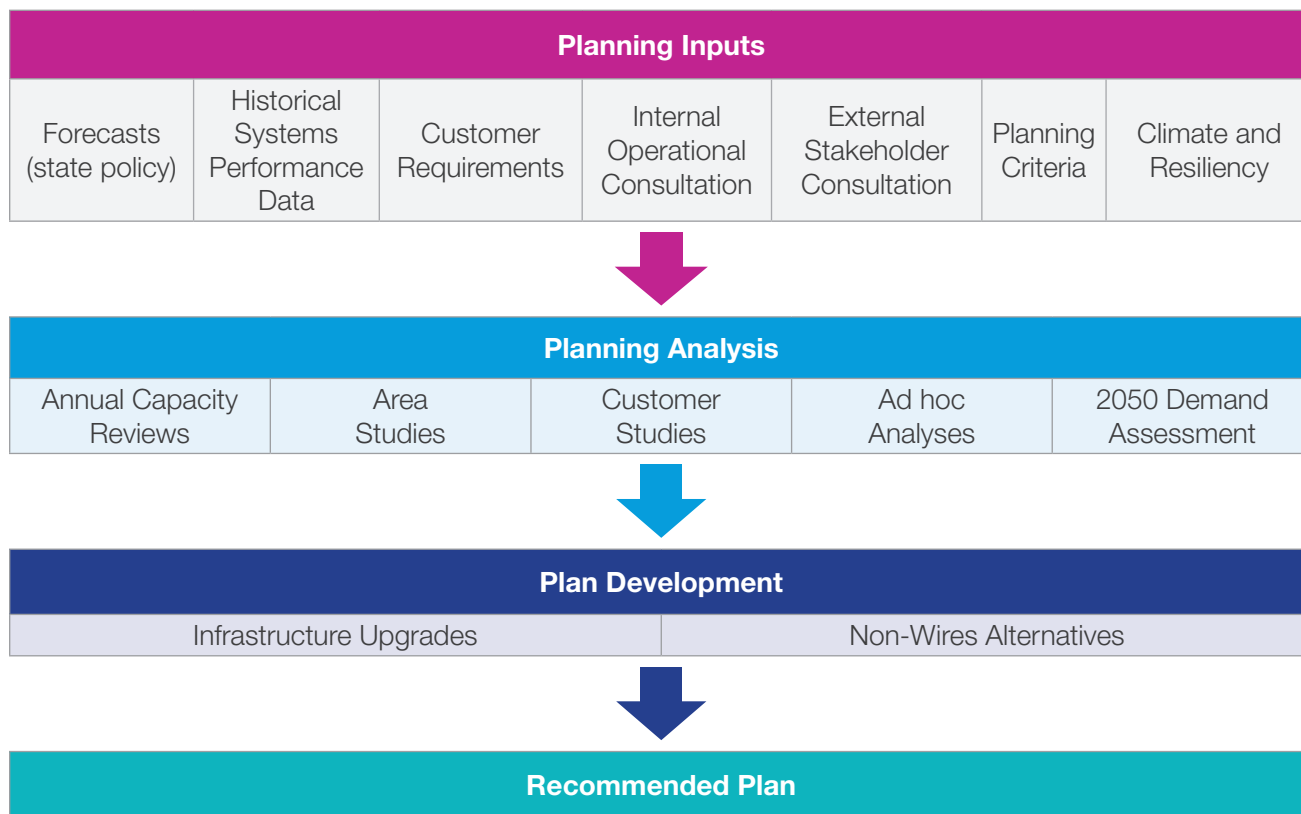
Over the next five years, National Grid proposes to invest more than \$2 billion to meet the Commonwealth’s electric-based approach to meeting its climate and clean energy goals and enable the just transition. As proposed in our Future Grid Plan these incremental investments focus on 1) network infrastructure, 2) technology and platforms and 3) customer programs. They have been carefully scoped to meet specific needs based on forecasted demand and identified system capacity and operational challenges. The graphic below summarizes our proposed investments by investment type.

*Proposed National Grid ESMP Investments 2025-2029*



These network investments include the upgrade and expansion of 10 existing substations, and building of 3 new substations over the next 5 years, and 18 existing and 28 new substations by 2034. They are driven primarily by adoption of electric transportation and building heating, which, as described in Section 5, are expected to increase the peak load across our network by 7% by 2029 and 21% by 2034 relative to 2022 levels. Absent making these system investments in advance of these new peak demand levels, the expected load growth will result in overloads of existing equipment, which would impact the safety and reliability of our network operation. In Sections 6 and 7, we provide details on the planning process and proposed investments across our network to proactively address these expected overloads and other needs; it explains the key factors driving these investment needs, including unacceptable asset condition and reliability performance concerns and the outcomes we established for the ESMP to assess each investment – reliable, ready, resilient, flexible, efficient. The graphic below provides a summarized view of our detailed planning process.

### The Company's system planning process



These proposed investments will ensure that over the next five years we can deliver more than 1 GW of capacity to support our customers' adoption of electric transportation and building heating and enable more DER on the system. But to achieve these results the proposed network investments need to be made proactively, not reactively.

### How energy efficiency, load flexibility, and other non-wires alternatives fit into the Future Grid Plan

Through the Commonwealth's investment in its nation-leading energy efficiency and demand response programs, the Company has avoided significant demand growth over the last decade, keeping annual load growth under 0.2% per year on average. By comparison, our forecasts show load growth starting at 1.3% per year, ramping to more 3% annual average load growth over the 2025-2050.

The Company will continue to advance significant energy efficiency savings through Mass Save, though more funding is expected to be targeted toward beneficial electrification. Concurrent with these investments, we will increase load flexibility from demand response and EV managed charging programs, though peak load impacts are forecast to be small in the next five years and will not have a material impact on overall system capacity and operational needs. In the next investment period – six-to-10-years – we anticipate more flexible load solutions to be available and more programmatic options to emerge, particularly as investments in the underlying communications and technology integration platforms materialize, allowing us to better manage and orchestrate these opportunities.

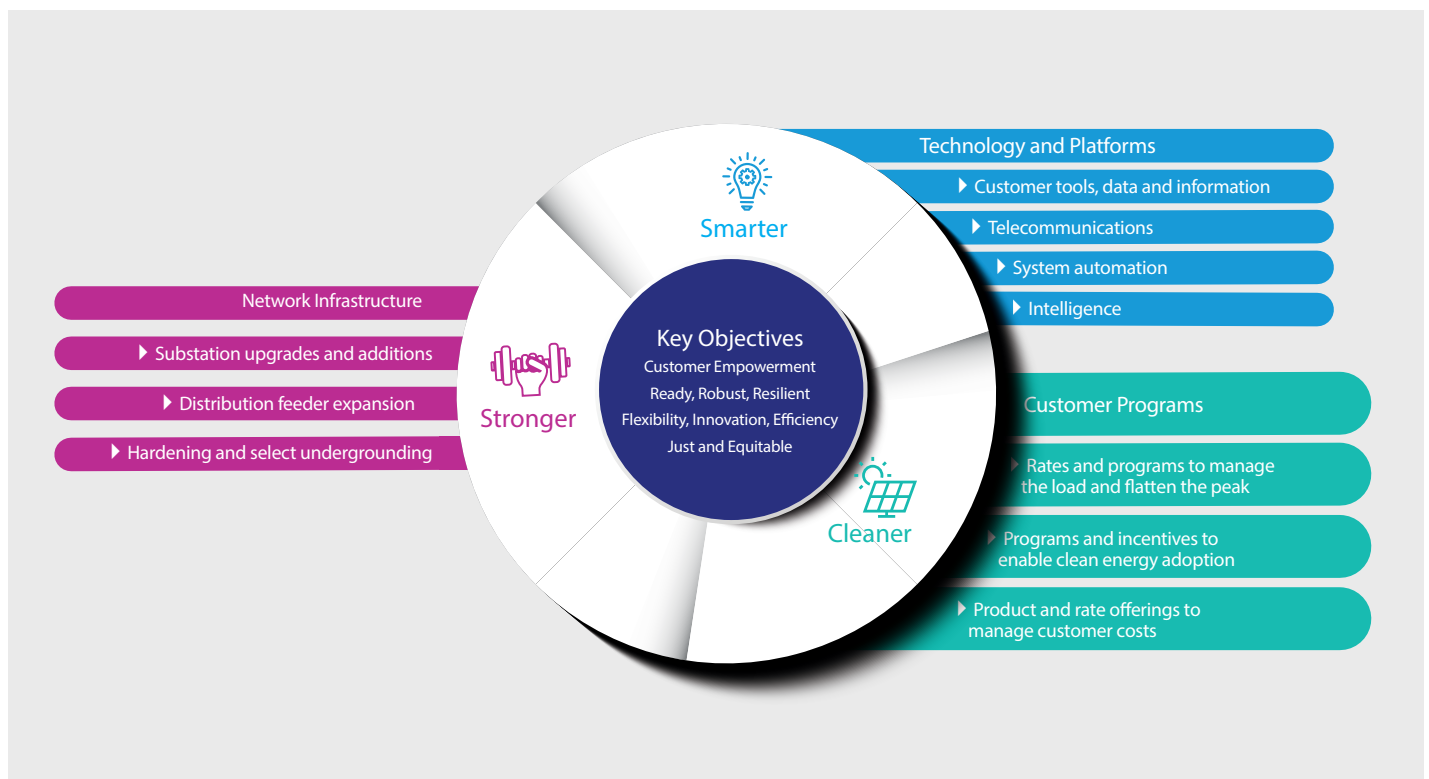


We also recognize that on a localized basis, flexible load solutions could provide opportunities to defer investments from the six-to-10-year time horizon to the following five-year period as well as meet more immediate needs, where we will not be able to build or expand traditional network infrastructure quickly enough to meet growing demand. To better understand the ability of these “bridge to wires” solutions to deliver required localized capacity and operational needs, National Grid is proposing both near term investments and pilots to advance these solutions through localized NWAs, including using distributed solar and batteries to create “Virtual Power Plants,” and applying newly deployed AMI infrastructure to advance TVRs and managed charging. A broader discussion on this topic is included in Section 6.

**The Company’s investments will realize multiple outcomes for customers and the system**

- ▶ Enabling an additional 4 gigawatts of capacity by 2035, enough to support an additional 1.1 million electric vehicles, 750,000 electric heat pumps;
- ▶ Upgrading hundreds of feeders to enable the connection of more clean distributed energy resources; and
- ▶ Improving local air quality as more cars, buses and trucks are electrified.

*The Future Grid plan investments will make the Company’s grid smarter, cleaner, and stronger*



As customers become more aware of and more educated on the emerging clean energy future, they are developing new expectations on accessing energy use data, monitoring their consumption, becoming more efficient, and participating more actively in energy markets. We anticipate customer participation in energy markets will continue to grow, particularly with the launch of FERC Order 2222.

Our Future Grid Plan recognizes these evolving expectations as opportunities. The Plan meets them through an integrated set of programs and investments that leverage communications and IT technology upgrades, like Advanced Distribution Management Systems (ADMS) and Distributed Energy Resource Management Systems (DERMS), which are currently being implemented. These IT platforms better enable and optimize smart devices, EVs, and demand response, which will be incentivized both in this Plan as well as through Mass Save energy efficiency and electrification programs.



*Proposed additional clean energy offerings to support ESMP objectives*

	Reliability	RE / DER	Storage	Climate Impacts	Electrification	Ratepayer Impact
Scale and evolve clean energy programs for Energy Efficiency, Heat Pumps, and Demand Response (through future separate filing)	✓		✓		✓	✓
Scale and evolve Clean Transportation Programs					✓	
Flexible Connections for EVs – Offer commercial and fleet EV charging customers to connect fleets in advance of system upgrades in constrained areas by allowing NG to actively manage charging					✓	
Targeted Energy Efficiency and Demand Response as Non-wire Alternatives – Offer additional EE and DR incentives to customers to reduce peak load based on targeted distribution network constraint	✓	✓	✓		✓	✓
Virtual Power Plant as Non-Wires Alternative – Aggregate BTM solar, connected batteries and thermostats to deliver grid services based on targeted distribution network constraint	✓	✓	✓		✓	✓
Leverage Flexibility Market Platform for Non-Wires Alternatives – Run auctions for flexibility service products based on targeted distribution network needs	✓	✓	✓		✓	✓
Resilient Neighborhoods Program – Develop and build solar + storage projects in EJC’s to deliver resiliency benefits (through future separate filing)	✓	✓	✓	✓		
Time-Varying Rates – Offer customers AMI-enabled rates that support smart use of the grid and reduce the overall costs of the clean energy transition (through future separate filing)			✓		✓	✓

Acronyms - See Glossary in Appendix 14.0

## 1.8 Climate impacts and building resilience

Climate change is already affecting the Commonwealth’s weather in dramatic ways. Historically, National Grid’s system could expect four major storm events with significant outage impacts each year; now the expectation has risen to ten storms per year. These storms can also be more intense and localized, creating wind and flood damage. Higher summer temperatures and humidity levels are generating multiple effects, from increased customer cooling saturation rates, higher cooling usage, higher summer peaks, and de-rating transformer capacity. Winters, while milder overall, are also subject to ‘polar vortex’ conditions that bring intense cold and snow, with corresponding outage risks and peak demand impacts. While National Grid has maintained reliability at levels exceeding 99.9% of system-wide availability, we recognize that such climate impacts present risks to sustaining our high levels of system reliability.

At the same time, the Commonwealth’s climate and clean energy goals add potential system reliability risks as we work to integrate grid-level renewable generation and storage, DERs, and new loads from beneficial electrification. Distribution system resilience and reliability must address these among other contributing factors, and National Grid has developed robust processes to respond to impacts on distribution system performance. Accordingly, preparing for and responding to the potential impacts of climate change is embedded in the way we plan, construct, and operate our system. As our understanding of the magnitude, scope, and breadth of climate-related challenges matures, the flexibility and robustness of the Company’s processes will allow additional measures to be developed and implemented. Our approach to system reliability and resilience is summarized below.

### *The Company’s distribution system reliability and resilience initiatives*

<b>Distribution Construction Standards</b>	Regular reviews and updates of distribution construction standards to address environmental change and its impact on system reliability performance.
<b>Vegetation Management</b>	Developing long-term strategy, planning, budgeting, and delivery of the vegetation management work plan to address vegetation impacts on safe and reliable service.
<b>Asset Management Practices and Distribution System Planning</b>	Practices and studies to identify existing and projected future system performance concerns and the infrastructure development required to address them.
<b>Infrastructure Development Programs</b>	Programs designed to address the addition, replacement, and/or modification of specific assets.
<b>Distribution Resiliency Hardening Programs</b>	A Resiliency Strategy which establishes an approach to identify, prioritize, and mitigate Company circuits that have demonstrated historical resiliency challenges. The strategy focuses specifically on hardening the investments that are anticipated to increase the resiliency of the distribution system.
<b>Asset Climate Vulnerability Assessments</b>	Consider the impacts of climate change over the next several decades to determine future risk to our built and future electric infrastructure. Identifying climate hazards including flooding, heat waves and high temperature, extreme wind, ice accretion, and wildfires.

To identify climate hazard risk, the Company developed the Climate Change Risk Tool (CCRT). “Climate hazard risk” relates to the physical and operational impact of changing climate hazards to our electric assets due to increasing chronic hazards and intensifying extreme acute hazards because of climate change. Climate hazard risk consists of three components:



The CCRT is the first of its kind in the energy sector and will help our business accurately map how our electric infrastructure may be impacted by climate hazards – such as floods or heatwaves – and to take early preventative and adaptive measures to significantly lower the risk of disruption to power networks, equipment, and communities, decades into the future.

Section 10 provides an overview of the approach the Company is taking to climate risk mitigation, shows how we applied the CCRT in this Plan, and includes specific actions we intend to take over the next five years to make our system more resilient. For example, the Plan proposes a new demonstration program targeting distribution circuits which have experienced large numbers of tree-related outages over the last three years and increasing minimum clearances between vegetation and power lines. We have also identified 13 substations as being at a high risk of flooding, which could damage critical equipment such as transformers, circuit breakers, and relays, and we have included investments to mitigate these impacts.

## 1.9 Workforce and societal benefits of a just transition

The investments made in the distribution network and customer programs through the ESMP will enable a variety of environmental, climate, and health benefits. Benefits will be realized at local and state levels through emissions reductions, improvements in air quality, and greater resilience.

In addition to energy and local environmental benefits, our Future Grid proposal is projected to increase economic activity on the order of \$1.4 billion and create an additional 11,000 jobs by 2030 throughout the Commonwealth, because of the labor resources required in construction labor, engineering, and planning and support functions to execute the Plan. These roles will include a mix of shorter duration work to support the build out of the network in the first five to 10 years of the Plan, and operational support function employment to support the network in operation. They will also include employees operating and managing grid performance and communications and IT platforms, as well as in the design and implementation of customer programs that support the electrification of heating and transportation, DER deployment, and other programs envisioned by the ESMP.

In addition to the direct expenditures associated with the proposed network investments, increased construction activities and infrastructure build-out will have positive tax and revenue impacts for some communities that host the planned infrastructure. For example, today, National Grid pays nearly \$240 million in state and local property taxes.

National Grid recognizes these changes as an opportunity to provide opportunities to local communities – particularly those that have not historically benefited from — or have been burdened by — such investment. To enable this, National Grid has launched a multi-pronged workforce development pilot program, focused on EJC's to provide the foundational training and education to create a talent pipeline from these communities.

The Company's workforce development strategy is built around 4 strategic pillars:

- ▶ Work-ready adults ready to reenter the workforce;
- ▶ College/university graduates starting their career;
- ▶ Traditional and vocational technical high school student passionate about learning in-demand skills; and
- ▶ Middle schools that promote STEM awareness of the Commonwealth's climate and clean energy goals.

### Workforce development pilot program academies



#### Energy Infrastructure Academy

- For Work Ready Adults
- Up to 15 participants
- ~200 hours of training

**Academy Focus:**

- ✓ Immersive upskilling
- ✓ Training in high-demand, high-value energy and utilities skills
- ✓ Enabling participants to apply for full-time, competitive union roles



#### Clean Energy Careers Academy

- For College and University
- Up to 30 students
- 8-weeks

**Academy Focus:**

- ✓ Engage students about the energy and utilities sectors
- ✓ Provide professional development
- ✓ Create connections that can lead to future internships, Co-ops, and full-time employment



#### Clean Energy Tech Academy

- For High School and VocTech
- Up to 50 students
- 3 to 5-day engagement

**Academy Focus:**

- ✓ Explore energy and utility sector careers
- ✓ Discuss different career pathways at National Grid
- ✓ Provide professional development



#### Clean Energy STEM Academy

- For Middle School
- Up to 30 students
- 3 to 5-day engagement

**Academy Focus:**

- ✓ Introduce students to National Grid and energy career options
- ✓ Interactive / hands on sessions about energy and utilities sectors
- ✓ Discuss energy concepts (e.g., electricity, gas, renewable energy, sustainability, etc.)

National Grid launched this pilot program in spring 2023, and we have already hired 15 graduates from our Work Ready Adults program. In our Future Grid Plan, we are proposing to expand our Workforce Development Program to increase the number of individuals we put through this program.

*The Company's Future Grid Plan will deliver a stream of customer and community benefits*

**By 2030, jobs and other economic benefits, including:**

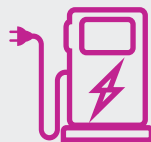


**11K**  
Full- and part-time jobs



**1.4B**  
Incremental economic output

**By 2035, 4 GW of new system capacity, enabling:**



**1.1M**  
EVs



**750K**  
Heat pumps

## 1.10 Conclusion and next steps

The Commonwealth's CECP is an equity-centered plan rooted in decarbonizing the electricity consumed by EDC customers and using this clean electricity to power all aspects of the economy, including homes, businesses, and transportation by 2050. Meeting the CECP goals requires all the Commonwealth's EDCs to develop comprehensive, thoughtful, and flexible plans that transform today's electric distribution grid, giving it new capabilities and expanding it at pace and scale to support this future, which will result in a doubling of electric demand over the next 25 years and the need connect and integrate at least 10 times the amount of renewable energy, 75 times the number of EVs, 150 times the number of heat pumps, and 2 times the amount of energy storage than today.

By developing and submitting this Future Grid Plan as our ESMP to the GMAC, the Company is taking a first step to defining the scope and scale of what we collectively must do over the next five, 10, and 25 years to combat climate change and enable a more electrified future. We are doing this by identifying the system investments and changes needed in the electric distribution system to meet growing demand, engaging broadly to stimulate ideas, and seeking input to ensure our investments are responsive to and supportive of the needs and expectations of our all customers and communities and make it easy to adopt the clean energy choices that work for them.

As a next step, the Company will work with Until and Eversource to conduct joint, professional facilitated technical sessions and other outreach to share our proposed plans, solicit feedback and educate customers throughout the state about the ESMP process and what it means for their energy future. We will take this feedback and incorporate it into our final submission to the DPU in January 2024.

Going forward, it will also be important to establish robust, consistent metrics to make our progress transparent and hold us accountable to ourselves, our customers, and to the Commonwealth for the proposed outcomes. Working with the Commonwealths’ other EDCs, we have identified the following metrics to be further developed and ultimately tracked with specific indicators and reporting methods.

Metric Category	Metric Description
<b>Implementation</b>	Delivery of ESMP investments relative to established milestones
<b>Resiliency</b>	Customers benefitting from resiliency investment and improvements in relevant outage statistics
<b>Electrification and DER Hosting Capacity</b>	Amount of Electrification and DER capacity enabled on the distribution system
<b>Use of DER as a Grid Asset</b>	Amount of capacity enabling Grid Services and Flexible Load
<b>Stakeholder Outreach</b>	Specific engagements with stakeholders including those in EJ, disadvantaged or under-served communities

**Together, we can make lasting changes that build a smarter, stronger, cleaner and more equitable energy future that empowers all who call Massachusetts home.**